February 11, 2015

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Mr. Gary Muller, Director
Frankfort Planning and Building Codes
Frankfort City Hall Building
315 West Second Street
Frankfort, KY 40601

RECEIVED
FEB 11 2015
CITY PLANNING &
BUILDING CODES DEPT.

RE: Frankfort Office Building
Sower Boulevard
Frankfort, Kentucky

Dear Mr. Muller:

On behalf of CRM/D W Wilburn, LLC I am pleased to submit a Development Plan application for the above referenced office building located on Sower Boulevard. The office building will be utilized by the Commonwealth of Kentucky for State offices.

Enclosed are the following documents:

1. Development Plan set of site and architectural plans as required by the Development Plan application (1 paper set and digital copy of CD)
2. Report of Geotechnical Exploration
3. Traffic Analysis performed by the Kentucky Transportation Cabinet
4. Franklin County PVA listing of adjacent property owners
5. Development Plan Application
6. $500 Development Plan Application fee

Procedurally, the following are milestones that are critical to the development of the facility that you and the Planning Commission should be aware of that may need further discussion with City Administration:

1. The Commonwealth of Kentucky will be processing the recording of the Final Record Plat for the subject property.
2. A Stormwater Pollution and Protection Plan has been reviewed and approved by the City Engineer and the site preconstruction meeting has been scheduled so that a Land Disturbance Permit can be issued.
3. With the issuance of the Land Disturbance Permit, the Developer intends to process a Foundation Permit for the building upon approval of the foundation plans by the Kentucky Housing and Buildings Department and desires to obtain this permit prior to approval of the Development Plan, plan approval of sanitary sewers through the City and the Division of Water.
4. A Final Record Plat for dedication of utility easements will be filed for approval and subsequent recording after approval of the Development Plan and after installation of utilities. The easements will be aligned in accordance with an as-built survey. It is the full intent to process sanitary sewer and water line extension plans through the Frankfort Plant Board, the Frankfort Sewer Department and the Kentucky Division of Water.

5. Pursuant to the recommendations of the Traffic Study performed by the Kentucky Transportation Cabinet, the extension of Sower Boulevard to the west will not be constructed in conjunction with this project. Although, the Development Plan indicates the reservation for future Right of Way purchase by others should the Sower Boulevard extension be necessary in conjunction with the development of future facilities. Subsequently, bonds associated with the construction of this street extension will not be necessary.

As a result of the critical schedule for this project, I am requesting an initial review by the Technical Review Team within 7 – 10 days of this submittal. Please let me know when this can be scheduled.

I appreciate your attention to this project and should there be additional information or questions, please feel free to contact me at any time.

RECEIVED
FEB 11 2015
CITY PLANNING &
BUILDING CODES DEPT.

Sincerely,

John L. Carman, RLA, FASLA

Cc: Mr. Doug Wilburn
Mr. Craig Turner
Mr. Andrew Casebier
Mr. Rick Eckhoff

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FEB 11 2015
CITY PLANNING &
BUILDING CODES DEPT.

REPORT OF GEOTECHNICAL EXPLORATION
FOR
SOWER BOULEVARD SITE
FRANKFORT, KENTUCKY
PROJECT NO. 1183-14-027
JULY 25, 2014

Prepared For

Commonwealth of Kentucky Finance and Administration Cabinet
Department for Facilities and Support Services
Division of Engineering and Contract Administration
403 Wapping Street, 1st Floor
Frankfort, Kentucky 40601

Prepared by
S&ME, Inc.
2020 Liberty Road, Suite 105
Lexington, Kentucky 40505

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July 25, 2014

Commonwealth of Kentucky Finance and Administration Cabinet
Department for Facilities and Support Services
Division of Engineering and Contract Administration
403 Wapping Street, 1st Floor
Frankfort, Kentucky 40601

Attention: Mr. Andy Casebier, Architect

Subject: **Report of Geotechnical Exploration**
Sower Boulevard Site
Frankfort, Kentucky
S&ME Project Number 1183-14-027

Dear Mr. Casebier:

S&ME, Inc. has completed the preliminary geotechnical exploration for the development of the property at the south end of Sower Boulevard in Frankfort, Kentucky. The purpose of this preliminary exploration is to obtain a general understanding of the subsurface conditions at this site and to assist in project development and planning. A design phase (final) geotechnical exploration will be performed by the Developer for the final design. We conducted this project in general accordance with S&ME Proposal No. 11-1400041 dated April 29, 2014 which was authorized by Commonwealth of Kentucky Delivery Order DO2-785-14000012351. This report explains our understanding of the project, documents our findings, and presents our conclusions and geotechnical engineering considerations.

S&ME appreciates the opportunity to provide these services to the Kentucky Finance and Administration Cabinet. If you have any questions, please call.

Respectfully submitted,
S&ME, Inc.

Daniel Furgason upon permission

Daniel A. Furgason, P.E.
Senior Engineer
Kentucky License No. 25,646

Andrew M. Fiehler, P.E.
Project Engineer
Kentucky License No. 23,977

Attachments: Report of Geotechnical Exploration

2014 Projects / 1183-14-027 Report

REPORT OF GEOTECHNICAL EXPLORATION
Sower Boulevard Site
Frankfort, Kentucky
S&ME Project No. 1183-14-027

REPORT OF GEOTECHNICAL EXPLORATION
Sower Boulevard Site
Frankfort, Kentucky
S&ME Project No. 1183-14-027

1.0 INTRODUCTION

S&ME, Inc. has completed the preliminary geotechnical exploration for the development of the property at the south end of Sower Boulevard, also known as the Carpenter Farm, in Frankfort, Kentucky. The purpose of this preliminary exploration is to obtain a general understanding of the subsurface conditions at this site and to assist in project development and planning. A design phase (final) geotechnical exploration will be performed by the Developer for the final design. We conducted this project in general accordance with S&ME Proposal No. 11-1400041 dated April 29, 2014 which was authorized by Commonwealth of Kentucky Delivery Order DO2-785-14000012351. This report explains our understanding of the project, documents our findings, and presents our conclusions and geotechnical engineering considerations.

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2.0 PROJECT INFORMATION

2.1 Site Description

The project site is located at the southern end of Sower Boulevard in Frankfort, Kentucky. The property is approximately 34 acres. The Site Topographic and Boundary Survey performed by HDR, Inc., dated April 18, 2014 indicates the site slopes downhill from the high point at the southern property edge at an approximate elevation of 810 feet. The site slopes downhill from the high point to approximately 772 feet near the southwest corner, 758 feet near the northwest corner and 752 feet along the east edge of the property.

The site is undeveloped with mostly open field and pasture with a few scattered trees and a tree-lined fence row. Prior to performing the field work, the south-western third of the site was bushhogged to remove overgrown brush and briars. The remainder of the property was overgrown with waist high weeds and brush with scattered clusters of trees and tree lined fence rows.

At least five closed depressions, indicating possible karst conditions, were present on the site.

2.2 Project Description

The Commonwealth of Kentucky will solicit proposals from developers to design and construct a 334,100 square foot office building on the state owned land. The configuration of the building(s) has not been determined. Conceptual planning performed by Sherman/Carter/Barnhart Architects suggests a four to five story building, however, the developer and their design team will determine the final location and configuration of the office building(s) to meet the size specified. The new parking lot areas will have spaces for 1,330 vehicles.

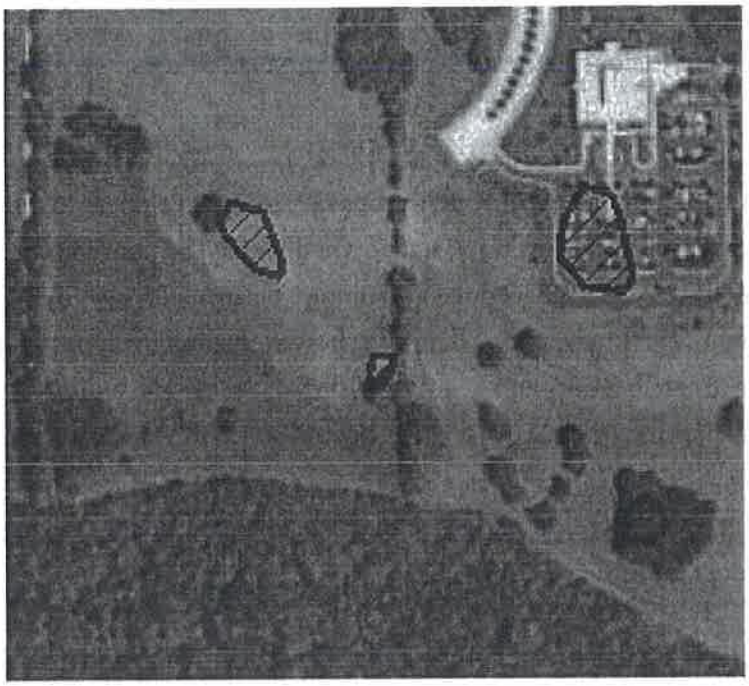
Since the project is in the preliminary design stage, no additional drawings, site grading or structural loading are currently available.

3.0 SITE GEOLOGY

A review of the *Frankfort East Quadrangle, Franklin County, Kentucky,* developed by the USGS indicates the site is underlain by Upper Lexington Limestone and Tanglewood Limestone. The Upper Lexington Limestone consists of the Devils Hollow Member and the Millersburg Member. The Devils Hollow is generally dark blueish gray to tannish gray, weathering to light brownish gray, micro- to fine-grained limestone, with no fossils, very thin to thin bedded and interbedded with shale. The Millersburg is generally interbedded limestone (65 to 75 percent) and shale, medium light gray, very fine to coarse grained, contains many fossils and is irregularly bedded. The Tanglewood Limestone, present primarily on the north and east side of the site, is medium to dark gray, fine to coarse grained, with very thin to thin beds and contains many small fossils.

While cavities and sink holes are common in the Tanglewood Limestone, the formation is more notable for an erratic bedrock surface and the development of soil filled, solution widened slots in the bedrock. At least two of our borings, borings B-20 and B-45, encountered such slots in the bedrock. Boring B-20 falls on an approximate line with the mapped sinkholes. Boring B-45 is also near a mapped sinkhole.

The map below shows the USGS mapped sink holes on the site. Most of the site is an area considered with a high potential for karst development. The southwest area of the site is generally indicated to have a moderate potential for karst development.



No faults are mapped on the USGS mapping in the area of the site. Regional dip across the site is relatively flat.

4.0 EXPLORATION METHODS

The procedures used by S&ME for field and laboratory sampling and testing are in general accordance with ASTM procedures and established engineering practice. Appendix B contains brief descriptions of the procedures used in this exploration.

4.1 Field Exploration

Andrew Fiehler, P.E., of S&ME visited the site to observe pertinent site features, surface indications of the site geology, to log the borings, and to direct drilling operations. A total of 88 soil test borings were advanced for this exploration. The borings were numbered B-1 through B-88. The boring locations and elevations were determined by an S&ME survey crew. Please note that our survey crew checked several spot elevations from the HDR survey to verify agreement. While most of the elevations were in agreement, a discrepancy of about three feet was noted with the benchmark iron pin at the end of Sower Boulevard with a noted elevation of 778.54 feet. Figure 2 in Appendix A shows the locations of the borings.

The borings were advanced using a track-mounted Deidrich D-50 drill rig using 4 1/4-inch O.D. augers. The drillers obtained soil samples in the soil test borings using a split-barrel sampler driven by an automatic hammer system in general accordance with ASTM D1586. We also

obtained three relatively undisturbed Shelby tube samples using direct push methods. Rock coring was performed upon auger refusal at 12 of the boring locations. The stratification lines shown on the Test Boring Records represent the approximate boundaries between soil and/or rock surfaces. The transitions may be more gradual than shown.

4.2 Laboratory Testing

The S&ME engineer sealed and returned the soil samples to our laboratory where he assigned the applicable laboratory tests. These tests are used to determine the engineering properties of the soil. All soil samples were visually classified by the geotechnical engineer in general accordance with the Unified Soil Classification System (ASTM D2487). We conducted natural moisture content determinations and Atterberg limits tests on selected soil samples to aid in classification. We conducted a standard Proctor test on composite bulk samples from Borings B-40, B-52, B-75 and B-84. California Bearing Ratio (CBR) tests were performed on bulk soil samples obtained from Borings B-52 and B-84. Unconfined compressive strength tests were performed on relatively undisturbed Shelby tube soil samples from Borings B-8, B-19, and B-35. Unconfined compressive strength tests were performed on bedrock core samples from borings B-12, B-15, B-22, B-25, B-31, B-37, B-47, B-50, B-66, B-68, and B-81. The obtained laboratory data and descriptions of the tests are included in Appendix C.

5.0 SUBSURFACE CONDITIONS

5.1 General Soil Profile

Our borings initially penetrated from 1 to 12 inches of topsoil (average 5.5 inches) underlain by low plasticity Lean Clay (CL) to a depth of up to 6.0 feet (average depth of 2.6 feet). The Lean Clay was brown, generally firm to very stiff with trace amounts of oxide nodules. The Lean Clay was soft at borings B-21, B-37 and B-65. Lean Clay was not encountered at five of the borings. Below the lean clay and topsoil high plasticity Fat Clay (CH) was encountered and extended to the weathered limestone horizon. The Fat Clay (CH) was brown to dark brown, generally firm to hard with trace amounts of oxide nodules. Chert fragments were observed in samples at a few locations. The Fat Clay was encountered to a depth of 30 feet at Borings B-45, and included limestone floaters from 6.0 to 15.0 feet, and was soft below a depth of 15.0 feet. No Fat Clay was encountered in Borings B-19, B-46 or B-48.

Below the clay, 0.2 to 3.6 feet (average 0.7 feet) of weathered limestone was encountered beginning at depths of 0.2 to 31.0 feet (Elevation 803.2 to 749.8 feet). Auger refusal, interpreted to be limestone, was encountered at depths of 0.5 to 32.2 feet (Elevation 802.7 to 748.6 feet). The depth to weathered rock could extend deeper than the auger refusal depth.

Limestone bedrock was cored to depths of 9.0 to 11.7 feet at 12 of the boring locations. The rock was generally light gray and fine to medium grained with Rock Quality Designation (RQD) of 31 to 100 percent. RQD values of 21 and 0 percent were measured in the top two feet of rock core at Borings B-63 and B-68. The RQD at Boring B-81 varied from 17 to 80 percent. One or more thin clay seams were observed in the cored rock at most of the borings where rock was cored. Small, minor solution cavities were observed in the limestone at Boring B-22.

Please refer to the Test Boring Records in Appendix B for details.

5.2 Groundwater

Groundwater seepage was not observed in any of the borings during drilling and all of the borings were dry upon completion of augering. The borings were backfilled with auger cuttings after the completion of drilling. As such, 24-hour water levels were not measured.

6.0 LABORATORY TEST RESULTS

Natural moisture contents of the low plasticity lean clay ranged from 3.7 to 34.7 percent. Atterberg limit tests of the lean clay indicated liquid limits ranging from 47 to 49 percent with a plasticity index ranging from 25 to 29 percent. Natural moisture contents for the high plasticity fat clay ranged from 10.3 to 37.2 percent. Atterberg limit tests of the fat clay indicated liquid limits ranging from 63 to 75 percent with a plasticity index ranging from 35 to 48 percent.

Two standard Proctor tests of bulk sample indicated a maximum dry density of 98.0 and 97.1 pcf at an optimum moisture content of 22.7 and 24.3 percent, respectively. Two California Bearing Ratio (CBR) tests of the bulk sample materials indicated CBR values of 3.1 and 4.1 percent. Unconfined compression testing (Q_u) was performed on undisturbed samples at three borings. The locations of the samples and test results are included in Table 1, below.

Table 1
Soil Strength Test Results

Boring	Depth (feet)	Soil Type	Q_u (psf)
B-8	3.0 – 5.0	CL	2,698
B-19	3.0 – 5.0	CH	1,562
B-35	3.0 – 5.0	CH	5,346

Unconfined compression tests (Q_u) were also performed on representative rock core samples from each of the 12 borings with rock core. The locations of the samples and test results are included in Table 2, below and in the Laboratory Summary Sheets in Appendix C.

Table 2
Rock Core Strength Test Results

Boring	Depth	Q_u (psi)
B-12	7.3 – 7.9	6,382
B-15	10.0 – 10.5	8,442
B-22	8.7 – 9.3	5,469
B-25	5.5 – 6.3	8,809
B-31	9.4 – 9.8	6,049
B-37	4.0 – 4.9	11,606
B-47	2.6 – 3.1	16,495
B-50	7.4 – 7.8	19,052
B-63	18.0 – 18.4	6,887
B-66	14.7 – 15.4	10,446
B-68	7.6 – 8.0	8,562
B-81	17.3 – 17.7	8,320

7.0 GEOTECHNICAL CONSIDERATIONS

We identified the following key issues that will impact the proposed site planning and construction:

Variable Rock Elevation - Foundations

Based on the anticipated loads for a multi-story building, foundations will likely be founded on bedrock. The bedrock is generally shallow thus we anticipate foundations bearing on bedrock; however the surface of the bedrock varies from an elevation 802.7 feet to 748.6 feet across the site. On a preliminary basis, we anticipate an allowable bearing pressure of 20 kips per square foot (ksf) to 50 ksf would be suitable for support of spread foundations on intact bedrock. This should be confirmed once foundation loads are available and more detailed analyses is performed. During foundation construction, 2-inch diameter probe holes should be drilled into the bedrock to allow for observation of the continuity of the bedrock. If seams or voids are observed in the bedrock, additional excavation may be required.

Karst Conditions

Sink holes were observed on the site and have been previously mapped as shown in Section 3.0 of this report. At least two of our borings encountered soil filled, solution widened slots in the bedrock. Additional investigation and remediation should be performed on these areas prior to construction. Boring B-45 was located adjacent to a previously mapped sink hole shown in the existing parking area northeast of the site. Soft, deep weak soils were encountered at this location.

Buildings should be sited away from known sinkholes. S&ME recommends the building not be constructed in the vicinity of Boring B-45 unless deep foundations, extended to bedrock are used. Consideration should also be given to siting the building either southwest or northeast of a line between borings B-20 and B-79. Pavement areas are often constructed over remediated sinkholes areas.

Additional exploration is needed to delineate the extent of the potential sinkholes at the site. Delineation of sinkholes can be accomplished by several methods including:

- Drilling a series of closely spaced rock soundings in an X pattern across the mapped depressions.
- Excavating test pits an X pattern across the mapped depression to expose the bedrock surface.
- Using geophysical testing, primarily electrical resistivity, to map the subsurface conditions.

Each of these approaches has their strong and weak points. Drilling soundings is a relatively inexpensive approach but requires that the drill rig be able to access the depression. Steep slopes may prevent access to portions of several of the depressions. Inferences of the bedrock profile must also be made between the sounding locations. While excavating test pits allows for a visual examination of the subsurface, excavating equipment has a limited reach. If the bedrock depth is beyond the extent of the equipment sufficient information may not be obtained. Electrical resistivity testing can provide a detailed profile of the subsurface with no visual impact to the site. Karst features can also be delineated after the topsoil has been stripped; however, waiting until earthwork has begun does not aid in site planning or budgeting for repair of sinkholes.

Prior to placing soil fill is also an opportune time to remediate sinkholes. Each sinkhole is unique and should be evaluated by an S&ME engineer who will provide recommendations for repair. Our experience indicates that one of the more cost effective means of repairing sinkholes

is to excavate the soil from the sinkhole area to expose the throat of the sinkhole and construct an inverted rock filter. An inverted rock filter consists of lining the sinkhole throat/excavation with filter fabric and backfilling the excavation with crushed stone starting with larger stone at the bottom and decreasing the size of the stone as the hole is filled. Typically the largest stone size used is rip-rap; however, we expect that the sinkholes at the site will be relatively shallow and may only require KYDOT #2 sized stone and smaller. Once the excavation is backfilled within about two feet of the surrounding grade, the filter fabric is folded over the top of the crushed stone and the area is capped with compacted clay.

High Plasticity Soils

Atterberg limits testing performed during this preliminary exploration indicate that the soil beginning at depths ranging from just below the topsoil to about five feet below the existing ground surface is comprised of high plasticity fat clay (CH). Soils with plasticity indices greater than 30 percent have a tendency to shrink and swell with changes in moisture content. The tested samples of the fat clay exhibited a plasticity index of 35 to 48 percent. Lightly loaded structural elements such as slabs-on-grade, sidewalks, pavement areas and non-load bearing walls are most susceptible to damage from shrinking and swelling soils. The final geotechnical exploration should include additional plasticity testing and swell testing to further define the engineering properties of the soil, and to determine the magnitude that the Fat Clay will impact development prior to implementing costly procedures to mitigate the plasticity issue.

Site Grading / Earthwork

The site grading operations will likely produce three distinct materials – soil, a soil/rock mixture, and shot rock. Each of these materials requires different methods for placement as structural fill.

Soil –Ideally, structural soil fill is defined as inorganic natural soil with a maximum particle size of 3 inches, plasticity index of 30 or less, and maximum dry density of at least 95 pounds per cubic foot (pcf) when tested by the standard Proctor method (ASTM D698). The standard Proctor tests performed indicate the on-site soils to have a maximum dry density of greater than 95 pcf; however, the plasticity index on two of the four samples exceeded 30 percent.

The fat clay encountered at the site is common throughout central Kentucky. Rather than wasting large volumes of soil that do not meet the structural fill criteria or importing soil that does meet these criteria in areas under building slabs and pavements, we recommend placing the higher plasticity soils in deeper fill areas (at least 3 feet below subgrade) and capping the fat clay with lean clay.

During construction, additional standard Proctor and Atterberg limits testing of fill soils should be performed to determine the moisture/density relationship and assess the plasticity of the soil prior to use as structural soil fill. Structural fill should be placed in relatively thin (6- to 8-inch) layers and compacted to at least 98 percent of the standard Proctor maximum dry density for the building pad and parking lot areas. The moisture content of the fill material should be maintained within 3 percent of optimum in order to obtain proper compaction.

In-place density testing must be performed on structural soil fill as a check that the previously recommended compaction criteria have been achieved. This allows our project engineer to monitor the quality of the fill construction and verify that his design criterion is being achieved in the field. We further recommend that these tests be performed on a full-time basis by S&ME. The testing frequency for density tests performed on a full-time basis can be determined by our personnel based on the area to be tested, the grading equipment used, and construction schedule. Tests should be performed at vertical intervals of one-foot or less as the fill is being placed. The on-site soils are sensitive to changes in moisture content, thus they will pump and rut during wet conditions. If grading operations are performed during periods of wet weather, these materials will not perform satisfactory during proofrolling. If soft or wet soils are encountered during the proofrolling observations, we recommend that the area be undercut to stiff native soils or stabilized in-place. Typical stabilization consists of undercutting/backfilling, placement of large crushed stone, or placement of geotextile/geogrid. Lime stabilization also works well and has the advantage of leaving the material in-place and reducing the potential for swell beneath slabs-on-grade. An alternative to wasting the wet clay soils is to temporarily stockpile this material for aeration and proper placement during dryer conditions. **As such, we highly recommend that earthwork be performed during the warm, dry summer months.**

Soil/Shot rock Mixture – The mass excavation will likely generate material that consists of both soil and rock. The soil/shot-rock mixture will be generated primarily during removal of the weathered rock zone and in mass rock excavations after blasting. Our experience is that compaction problems occur when the soil/shot-rock mix is placed using "normal rock placement procedures". The soil/shot-rock mixture is a problematic material from an earthwork perspective, as it is difficult to compact. Soil/shot-rock should not be used as fill under the proposed structures.

Placing the soil/rock mix requires using modified soil fill procedures to reduce the potential for future problems. If the mix contains more than 15 percent soil, it should be placed using the

modified soil fill procedures described in this paragraph. For the soil/rock mix, the lift thickness should be maintained between 8 and 12 inches and the moisture content of the soil portion should be near the optimum moisture content or slightly above. The maximum particle size should be limited to 12 inches in any one dimension. A combination of tracked equipment, heavy rubber tired vehicles (haul trucks, scrapers, etc.), and a Caterpillar 815 or larger sheepsfoot compactor are typically adequate for placing this material. Approval of the lift placement and compaction will be determined by a S&ME engineer on the basis of the moisture content of the soil within the matrix, the blend of rock pieces, and the behavior of the fill material under the compactive effort. The goal is to minimize voids and to promote the breakdown of weak point-to-point contact of the rock pieces.

Shot rock – After the soil overburden and weathered rock zone has been removed, bedrock removal will likely be required. We anticipate that blasting will be required to remove most of the bedrock. Typically, blasting contractors will "overshoot" the rock to depths below the required elevations. As such, the blasted material will need to be removed to competent bedrock. **Any "heaved rock" resulting from blasting operations should be removed to expose the underlying undisturbed bedrock. "Heaved rock" is not adequate for supporting the proposed building, floor slabs, and/or pavement areas.**

The shot-rock material generated from bedrock excavation at the site can also be used as structural fill material, especially under the pavement areas. Shot-rock fill should not be used beneath the proposed building pads. Shot-rock fill is defined as clean shot-rock that contains less than 10 percent soil content. The following criteria are recommended for shot-rock fill construction:

- The subgrade must be free of ponded water and stable prior to and during shot-rock fill placement.
- Where additional soil fill is required to achieve the finished grades, the shot-rock fill should be covered with a non-woven geotextile filter fabric in order to reduce the potential for the migration of soil into the underlying shot-rock. Structural soil fill criteria and placement recommendations are outlined above.
- Shot-rock fill may be used up to the design subgrade elevation in pavement areas. If shot-rock fill is placed to the pavement subgrade elevation, we recommend that it be "choked off" with a thin (3 to 4 inch thick) layer of dense graded aggregate (DGA) prior to constructing the pavement section. The shot-rock fill should also contain sock covered, perforated pipes at least 4-inch diameter to inhibit water from building up beneath the pavement section. The drainage pipe should include a headwall at the outlet end, and

should drain to daylight away from the pavement area. Consider the use of a channel lined ditch at the end of the headwall to reduce erosion.

- Limit the maximum particle size to 12 inches in any one dimension.
- Shot-rock should have adequate smaller rock fragments to effectively "choke" the larger rock pieces by filling the voids or open spaces. The larger rock pieces should lie flat and not overlap each other. The percentage of soil in the fill should be limited to a maximum of 10 percent.
- Place the clean shot-rock fill in maximum 18-inch thick lifts. The actual lift thickness will vary as the particle size and soil content varies.
- Adequate compaction of shot-rock fill normally requires six to eight passes of heavy construction equipment on the fill surface. Typically, the equipment used consists of bulldozers and dump trucks. The geotechnical engineer should evaluate the suitability of the proposed compaction equipment and techniques. Approval of the lift placement and compaction will be determined by a S&ME engineer or geotechnician.

Monitoring of shot-rock must be done visually by an experienced geotechnician working directly and closely with one of our senior geotechnical engineers. Placement of shot-rock is a blend of art and science and the experience of the equipment operator and testing personnel are crucial to achieving the desired performance from the fill. Key indicators include material type, gradation, soil percentage and moisture content, equipment used to place the material, and how the fill material reacts to the equipment. The placement criteria will vary somewhat as the material varies. For example - as the soil content increases, the lift thickness should be decreased.

Site Grading / Site Selection

Site grading plans have not yet been developed. While the depth to weathered rock in the explored areas ranged from about 0.2 to 31.0 feet below existing grades the average depth was about 6 ½ feet. The site grading plan should take into account the following:

- Topsoil thickness ranged from 1 to 12 inches across the site.
- Highly plastic clay soils present at shallow depths.
- Cuts extending just a few feet below the existing ground surface will likely encounter rock in most areas. Rock excavation should be anticipated in utility excavations. If blasting is performed during building pad preparation, consider drilling and blasting to excavate a trench for underground utilities.
- Remediation of sink holes including excavation and filling with properly graded material.

- Elevations across the site vary by as much as 60 feet. We anticipate that free-standing retaining wall, terracing of the site, or a combination of both will be required.
- Depending on the grade selection, a deep rock cut (greater than 20 feet to 30 feet) is possible. If a deep cut is planned the cut slope should be further evaluated and designed by a geotechnical engineer. Fill slopes should also be evaluated by a geotechnical engineer.

Construction Accessibility / Site Degradation

Based on our on-site observations and our experience with similar soil conditions, construction accessibility will be problematic if attempted during cold/wet seasons of the year. Additionally, positive drainage should be maintained at all times during construction. The clay soils will become very soft if they are allowed to absorb water. Construction accessibility should be better during the hot/drier months of the year. During the wet periods, a construction road or pad consisting of a geo-textile fabric overlain by gravel may be required. Soft and/or wet areas may require selective undercutting, repair after construction is completed, or other treatment as recommended by the geotechnical engineer. We recommend that this site be graded and developed during warm, dry months of the year.

Pavement

General Discussion – Site development plans were not yet available; however, we understand that the project will require parking for 1,330 vehicles. Pavement design is a combination of traffic volume (both number and types of vehicles), the subgrade strength, and pavement materials (either asphalt or concrete). Once specific site development plans and grading plans are developed, a pavement design should be performed. For this preliminary exploration we performed two CBR tests of the on-site soils which indicated values of 3.1 percent and 4.1 percent. These results are common for soils throughout central Kentucky.

Flexible Asphalt Pavement – In order for pavement to perform satisfactorily, the subgrade soils must have sufficient strength and be stable enough to avoid deterioration from construction traffic and support the paving equipment. In addition, the completed pavement section must resist freeze/thaw cycles and wheel loads from traffic. Generally, construction traffic loading is more severe than the traffic after construction.

The preliminary pavement section given below is based on the assumption that the subgrade is prepared in accordance with the recommendations presented earlier in this report, and that any newly placed fill soils for the pavement subgrade have been compacted to at least 98 percent of

the standard Proctor maximum dry density at moisture contents ranging from ± 3 percent of the soil's optimum moisture content as determined by the standard Proctor test.

Minimizing infiltration of water into the subgrade and rapid removal of subsurface water are essential for the successful long-term performance of the pavement. Both the subgrade and the pavement surface should have a minimum slope of one-quarter inch per foot to promote surface drainage. Edges of the pavement should provide a means of water outlet by extending the aggregate base course through to side ditches. Side ditches should be at least 2 feet below the pavement surface.

The materials should conform and be placed and compacted in accordance with the applicable sections of the Kentucky Transportation Cabinet (KTC) Standard Specifications for Road and Bridge Construction, latest edition. We used the American Association of State Highway and Transportation Officials (AASHTO) Guide for Design of Pavement Structures (1993) as a basis for our flexible pavement thickness analysis. The total pavement thickness requirement is a function of the California bearing ratio (CBR). We performed CBR testing on two bulk samples of the on-site soils.

Specific traffic volume estimates were not available; however, we understand that parking for 1,330 vehicles will be required. We estimated the ESAL's for the development based on the anticipated daily traffic. The following pavement design recommendations are based on the assumptions of a 20 year service life, and 50,000 ESAL's for light duty pavement and 1,500,000 ESAL's for heavy duty pavement. Once site development plans are available, a specific pavement design should be performed.

S&ME recommends that the pavement section (base stone and asphalt) be placed after the majority of the new building construction has been completed. S&ME recommends that both binder and surface mix asphalt be placed sequentially before traffic is allowed on the new pavement. **S&ME recommends that the light duty pavement section be used for light automobile parking, and that the heavy duty pavement section be used for drive lanes and roadway.**

If construction sequencing requires that new pavement areas be constructed prior to substantial completion of the building, do not allow construction traffic on the finished pavement. The following pavement sections are based on our ESTIMATED traffic volumes. The sections listed below should be considered as ESTIMATES and used for general budgeting purposes only. A final design should be performed once the final design and use of the project are completed.

ESTIMATED Asphalt Pavement Bearing on Soil with a CBR Value of 3 percent – Maximum Asphalt Option

MATERIAL	LIGHT DUTY	HEAVY DUTY	KY TRANSPORTATION CABINET SPECIFICATION
Asphalt Surface Course	1-½ Inches	1-½ Inches	Section 400
Asphalt Binder Course	5 Inches	9 Inches	Section 400
Dense Graded Aggregate	6 Inches	9 inches	Section 303

ESTIMATED Asphalt Pavement Bearing on Soil with a CBR Value of 3 percent – Maximum Aggregate Option

MATERIAL	LIGHT DUTY	HEAVY DUTY	KY TRANSPORTATION CABINET SPECIFICATION
Asphalt Surface Course	1-½ Inches	1-½ Inches	Section 400
Asphalt Binder Course	3 Inches	6 Inches	Section 400
Dense Graded Aggregate	10 Inches	18 inches	Section 303

Depending on the final site grades, a significant volume of shot rock may be generated during site preparation. Placing shot rock at the pavement subgrade elevations would increase the CBR value and thus possibly allow for a reduction in the above estimated pavement sections.

S&ME should monitor the installation of the asphalt and base, check the installed thickness of the aggregate materials, and perform in-place density tests. Asphalt placement should be monitored full-time to observe placement and compaction procedures. Asphalt samples should be collected periodically and tested for asphalt cement content, aggregate gradation, and Marshall Density.

Impervious Concrete Pavement – We recommend that in areas where heavy, concentrated loads are expected (i.e. - dumpster area, entrances, etc.) concrete pavement section be used. For dumpster areas, we recommend that rigid pavement be extended beyond the dumpster pad for the entire length of the garbage truck. The pavement subgrade should be stabilized in accordance with the recommendations for the asphalt paved areas, and the related recommendations in this report. We recommend that the concrete pavement be supported by at least a 6 inch layer of compacted DGA. The DGA should be compacted to a minimum of 98 percent of the standard Proctor maximum dry density. We recommend a minimum concrete section of 8 inches for this site. The concrete should be air-entrained and have a 28-day compressive strength of 4,000 psi. Joint spacing should be at a maximum spacing of 15 feet each way.

Water Management

Management of both surface and subsurface water will be a key issue to development of the site. Subsurface water will tend to migrate toward the sink holes and other lower elevation areas of the site. The earthwork should be phased such that the swales are stabilized and are able to convey water away from the site while maintaining the integrity of the site.

Future Studies

The above items warrant further attention and should be addressed on a more detailed design phase exploration program. Additionally, the design phase geotechnical exploration should address the following:

- Additional plasticity testing and swell testing should be performed to define the potential impact of expansive clays.
- Once structural loading and site grading is determined, additional evaluation should be performed for foundation loading.
- Additional exploration should be performed to further investigate the sink holes on the site and to provide specific recommendations for remediation.
- Cut and/or fill slope stabilities should be evaluated once a site grading plan is developed.

We anticipate a site seismic classification of either "B" or "C" depending on the final building design. It is our experience that a site specific seismic evaluation could allow for a less conservative structural design and realized construction cost savings.

8.0 FOLLOW UP SERVICES

This report is preliminary and is not intended for final design purposes. Additional geotechnical work will be required once specific building locations, types, and grades have been established.

9.0 LIMITATIONS

This report has been prepared for the exclusive use of Commonwealth of Kentucky Finance and Administration Cabinet, Department for Facilities and Support Services for specific application to this project site. Our conclusions and recommendations have been prepared using generally accepted standards of geotechnical engineering practice in the Commonwealth of Kentucky. No other warranty is expressed or implied. This company is not responsible for the conclusions, opinions, or recommendations of others based on these data.

Our conclusions and recommendations are based on the design information furnished to us, the data obtained from the previously described preliminary geotechnical exploration, and our past experience. They do not reflect variations in the subsurface conditions that are likely to exist between our borings and soundings and in unexplored areas of the site. These variations result from the inherent variability of the general subsurface conditions in this geologic region.

We recommend that the Owner retain S&ME to continue our involvement in the project through the subsequent phases of design and construction. Our firm is not responsible for interpretation of the data contained in this report by others.

Important Information about Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. No one except you should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one — not even you* — should apply the report for any purpose or project except the one originally contemplated.

Read the Full Report

Serious problems have occurred because those relying on a geotechnical engineering report did not read it all. Do not rely on an executive summary. Do not read selected elements only.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, do not rely on a geotechnical engineering report that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions only at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an opinion about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual

subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject to Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce the risk of such outcomes, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations" many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Obtain Professional Assistance To Deal with Mold

Diverse strategies can be applied during building design, construction, operation, and maintenance to prevent significant amounts of mold from growing on indoor surfaces. To be effective, all such strategies should be devised for the *express purpose* of mold prevention, integrated into a comprehensive plan, and executed with diligent oversight by a professional mold prevention consultant. Because just a small amount of water or moisture can lead to the development of severe mold infestations, a number of mold prevention strategies focus on keeping building surfaces dry. While groundwater, water infiltration, and similar issues may have been addressed as part of the geotechnical engineering study whose findings are conveyed in this report, the geotechnical engineer in charge of this project is not a mold prevention consultant; ***none of the services performed in connection with the geotechnical engineer's study were designed or conducted for the purpose of mold prevention. Proper implementation of the recommendations conveyed in this report will not of itself be sufficient to prevent mold from growing in or on the structure involved.***

Rely on Your ASFE-Member Geotechnical Engineer for Additional Assistance

Membership in ASFE/The Best People on Earth exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

ASFE
THE BEST PEOPLE ON EARTH

8811 Colesville Road/Suite G106, Silver Spring, MD 20910
Telephone: 301/565-2733 Facsimile: 301/589-2017
e-mail: info@asfe.org www.asfe.org

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IIGER06085.0MRP

APPENDIX A

SITE LOCATION/TOPOGRAPHIC MAP

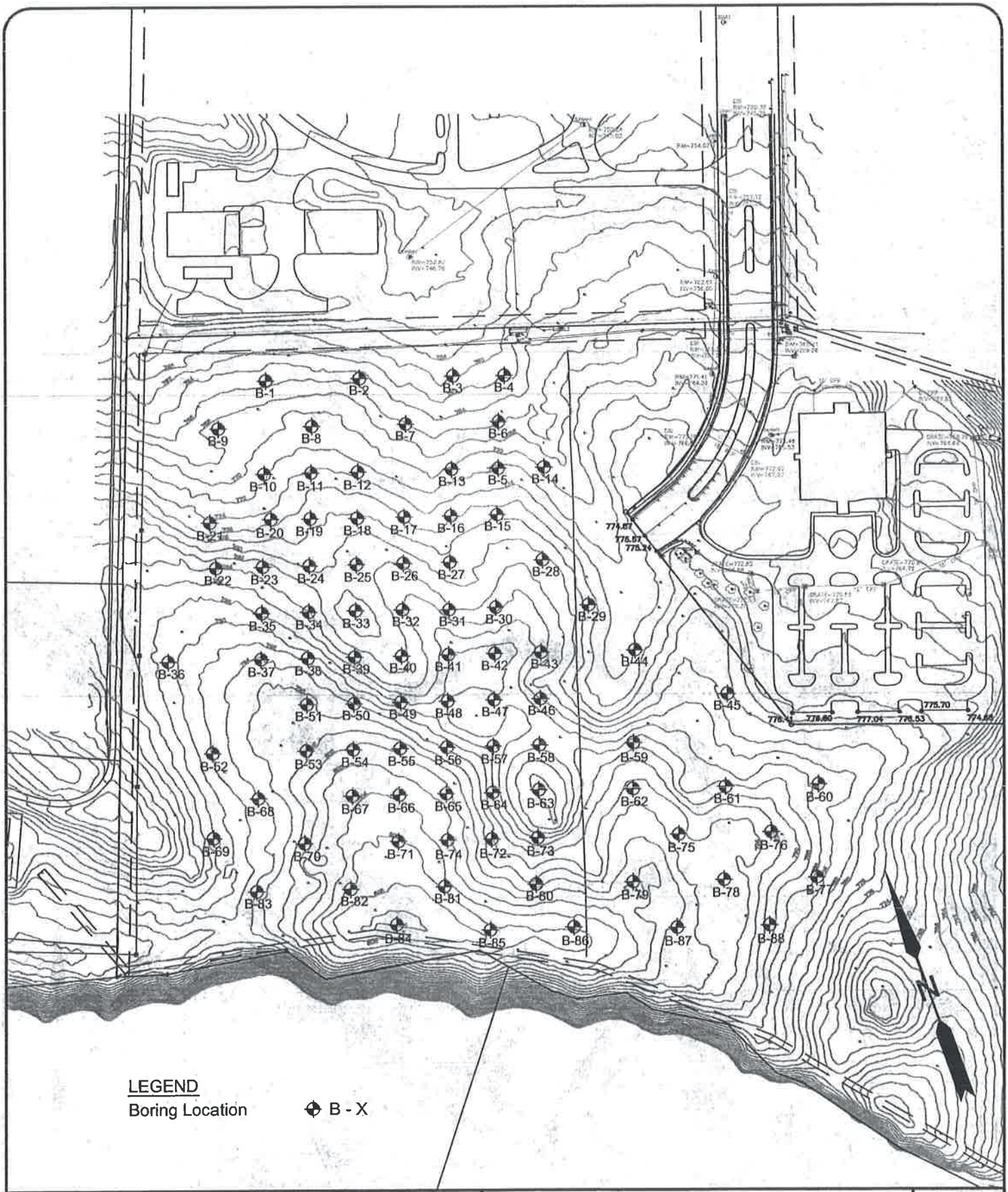
BORING LOCATION PLAN

SCALE:	1" = 2000'
DATE:	6/27/2014
DRAWN BY:	LHR
PROJECT NO:	1183-14-027

S&ME
WWW.SMEINC.COM
2020 LIBERTY ROAD, SUITE 105
LEXINGTON, KENTUCKY 40505
PHONE: 859-293-5518

SOWER BOULEVARD SITE
VICINITY MAP
FRANKFORT, KENTUCKY

FIGURE NO.
1



SCALE: 1" = 200'	S&ME	SOWER BOULEVARD SITE
DATE: 7/9/2014	WWW.SMEINC.COM	BORING LOCATION PLAN
DRAWN BY: I HR	2020 LIBERTY ROAD, SUITE 105	FRANKFORT, KENTUCKY
PROJECT NO: 1183-14-027	LEXINGTON, KENTUCKY 40505	FIGURE NO. 2
	PHONE: 859-293-5518	

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CITY PLANNING &
BUILDING CODES DEPT.

TO: Sam Ruth
Commisioner, Finance and Administration Cabinet

THROUGH: Steve Waddle, PE
State Highway Engineer, Kentucky Transportation Cabinet

THROUGH: Jeff Jasper, PE
Director of Division of Highway Design, Kentucky Transportation Cabinet

FROM: Wendy Southworth, PE
Division of Highway Design

SUBJECT: Capacity of KY 676 (East-West Connector) and Sower Boulevard Intersection with the addition of two possible State Office Buildings on the Carpenter Farm Tract

Per your request, an engineering analysis has been performed on the current KY 676 (East-West Connector) and Sower Boulevard intersection and its ability to handle an increase in traffic volumes due to the construction of two state office buildings. By determining the overall capacity of this intersection, it is possible to determine if this Intersection will exceed its available capacity with the construction of two new state office buildings. And further if the intersection does exceed capacity with the construction of two new buildings, how many employees can utilize the new facility without causing capacity issues at this intersection.

This intersection is located between two major intersections. The KY 676 (East-West Connector) and KY 1659 intersection is approximately half a mile west of the KY 676 and Sower Boulevard intersection. KY 1659 is Martin Luther King Boulevard to the north, which is a major route to other state office buildings within Frankfort. The KY 676 (US 421) and US 60 Interchange is approximately one and a half miles east of the KY 676 and Sower Boulevard intersection. The KY 676 and Galbraith Road intersection is a minor intersection located between Sower Boulevard and US 60 on KY 676 and carries traffic into a residential area that connects to US 60. (See the attached Location Map)

In order to address the future capacity of the KY 676 and Sower Boulevard intersection the existing traffic has to be analyzed. The existing intersection geometry consists of two KY 676 east bound through lanes with a right turn lane onto Sower Boulevard and a left turn lane into Wilson's Nursury, and includes a total approach width of 48 ft (4 lanes at 12 feet each). There are also two KY 676 west bound through lanes (one through lane shares with right turn vehicles into Wilson's Nursury) and a left turn lane onto Sower Boulevard with a total west bound approach width of 36 ft (3 lanes at 12 feet each). The Wilson's Nursury access entrance includes one exit lane and one entrance lane with each lane measuring 15 feet and total entrance width of 30 feet. The Sower Boulevard approach consists of one left turn lane (onto KY 676 west bound), one through lane (into Wilson's Nursury) and one right turn lane (onto KY 676 east bound) with a total approach width of 36 feet (3 lane at 12 feet each).

Based on the current geometry of the KY 676 and Sower Boulevard intersection, an intersection capacity analysis was utilized to determine the maximum capacity of the intersection. Assuming that maximum capacity will occur at a Level of Service (LOS) D, the corresponding capacities of the Sower Boulevard approach and the KY 676 east bound approach are 1,900 vehicles per

hour (vph) and 2,400 vph respectively. Therefore, the overall maximum capacity of the intersection would be 4,300 vph. The current volume through this intersection is estimated to be 2,100 vph which is approximately half of the maximum capacity for the intersection. Further analysis using the Highway Capacity Software was utilized and a very similar conclusion was made.

With the construction of a large state office building and a small state office building, there is the potential for 1,650 employees to utilize the new facility. Although the number of vehicles traveling through the intersection would be greatly increased, based on the maximum capacity determined for the intersection, the intersection should continue to operate at an acceptable Level of Service. With the additional anticipated traffic due to the future development, the KY 676 and Sower Boulevard intersection should not exceed the maximum capacity for the intersection. However, it is important to note that an increase in delay is likely to occur on the US 60 Bypass, but it should not hinder the operation of the bypass as a whole. Also, with the addition of the two buildings, Sower Boulevard would have to be extended to the west to provide access to these buildings. The estimated cost for the Sower Boulevard extension is $700,000.

However, if after construction of the two proposed office buildings, it is determined that the existing intersection is not performing as well as anticipated, the development of an additional approach connecting Sower Boulevard to KY 676 may need to be designed to relieve some of the traffic from the Sower Boulevard and KY 676 intersection. Several preliminary alternates have been reviewed for this study. A four-lane curb and gutter urban typical section with an eighteen foot median was utilized for these preliminary alternates. As shown in the attached maps, one of the alternates, East-West Connector Access, would connect Sower Boulevard to KY 676 at an existing undeveloped access point which already includes both a left and right turn lane onto the access road. Another alternate, Glenns Creek Road Access, would connect Sower Boulevard with KY 1659 (Glenns Creek Road) approximately 1,500 feet south of the KY 676 and KY 1659 intersection. This alternate would require a significant amount of excavation, therefore greatly increasing the estimated cost as compared to the East-West Connector Access. The final potential alternate included a cross country alignment going towards I-64. This alternate would include a new bridge across the Kentucky River and because of extensive construction cost, this alternate was not developed any further.

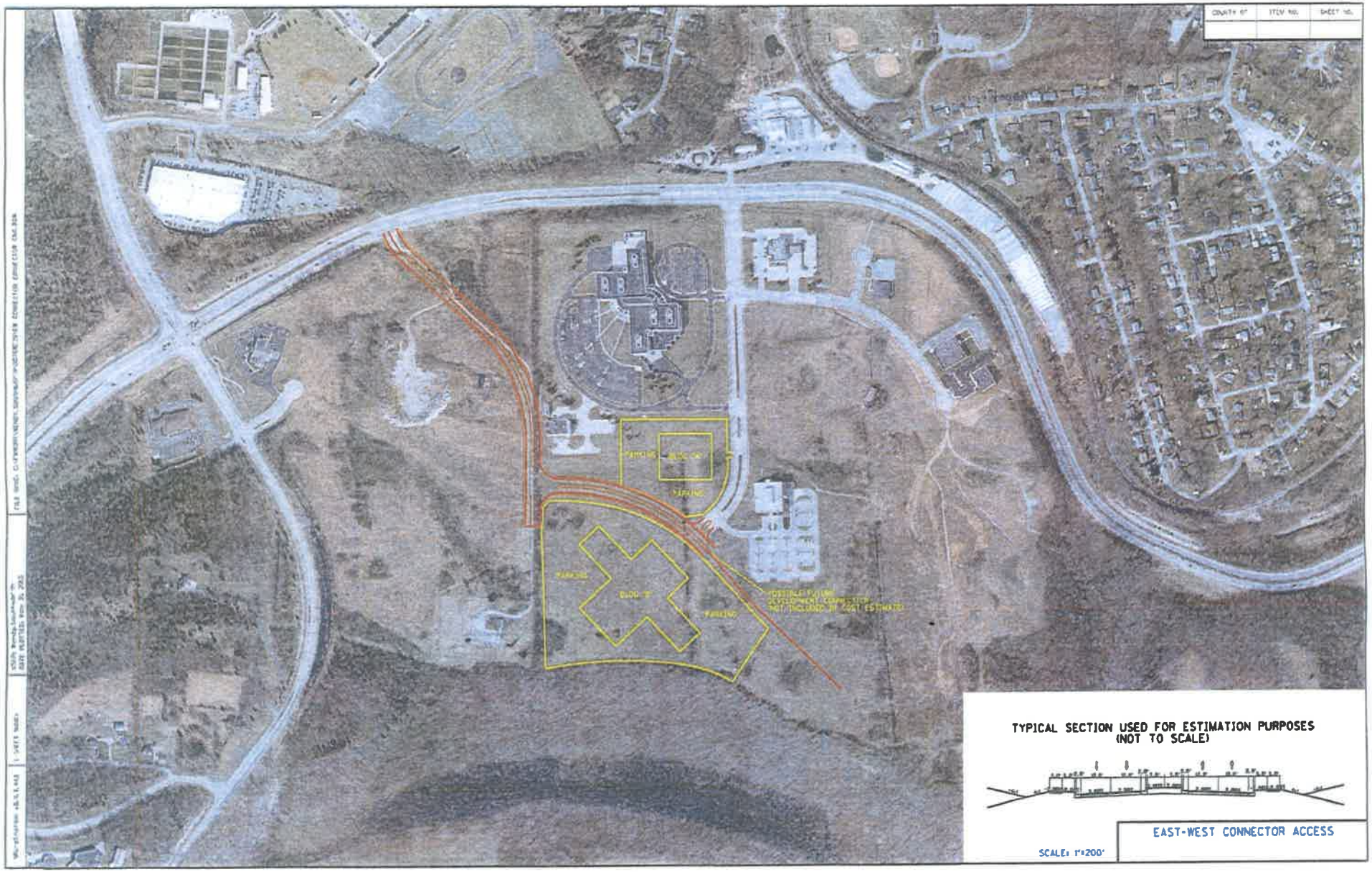
Below is a table showing the preliminary construction estimates for the above alternates. Please note that the estimated costs are construction cost only and do not include right of way or utility costs.

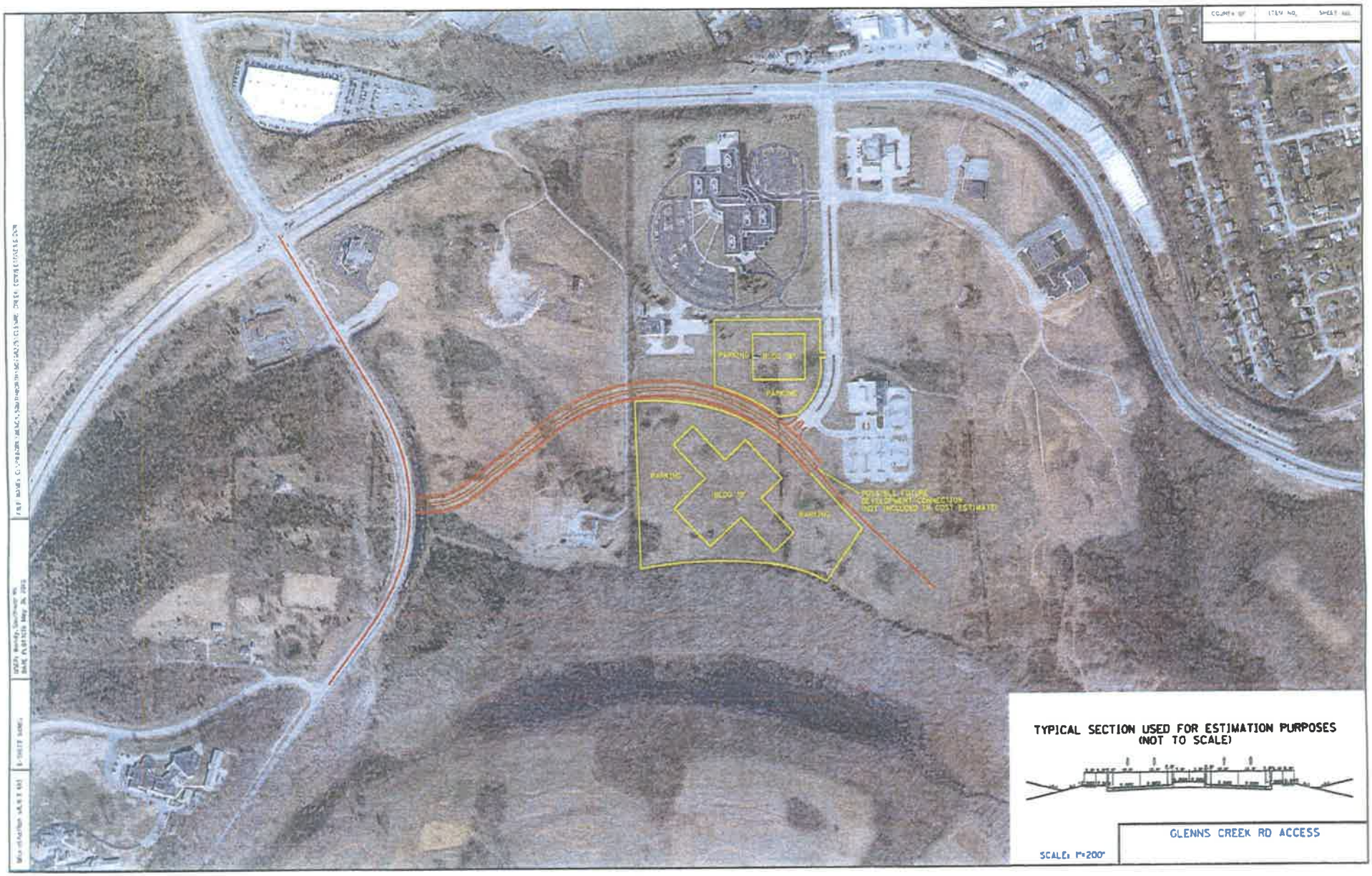
Alternate Description	Estimated Cost (Construction Only)
East-West Connector Access	$2,000,000
Glenns Creek Connector	$4,435,000
I-64 Connector	$20,000,000 (Interchange not included)

In summary, the Kentucky Transportation Cabinet (KYTC) believes that the current intersection geometry is adequate to handle the additional volume of vehicles, if both, the large office building and the small office building are constructed in the Sower Boulevard Development. KYTC also believes that additional funds of approximately $50,000 should be made available for upgraded signalization and striping for this intersection.

If there are any questions or concerns concerning the results as explained above, please feel free to contact KYTC-Division of Highway Design.

KY 676 (EAST-WEST CONNECTOR)
AND SOWER BLVD INTERSECTION
LOCATION MAP


COUNTY OF
ITEM NO.
SHEET NO.
PARKING
BLDG "B"
PARKING
PARKING
BLDG "A"
PARKING
TYPICAL SECTION USED FOR ESTIMATION PURPOSES
(NOT TO SCALE)
EAST-WEST CONNECTOR ACCESS
SCALE: 1"=200'



TYPICAL SECTION USED FOR ESTIMATION PURPOSES
(NOT TO SCALE)

GLENNS CREEK RD ACCESS

SCALE: 1"=200'

McGRAW-EDISON®

energy solutions

DESCRIPTION

The Galleon™ LED luminaire delivers exceptional performance in a highly scalable, low-profile design. Patented, high-efficiency AccuLED Optics™ system provides uniform and energy conscious illumination to walkways, parking lots, roadways, building areas and security lighting applications. IP66 rated.

Catalog #		Type	
Project			
Comments		Date	
Prepared by			

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CITY PLANNING & BUILDING CODES DEPT.

SPECIFICATION FEATURES

Construction
Extruded aluminum driver enclosure thermally isolated from Light Squares for optimal thermal performance. Heavy-wall, die-cast aluminum end caps enclose housing and die-cast aluminum heat sinks. A unique, patent pending interlocking housing and heat sink provides scalability with superior structural rigidity. 3G vibration tested. Optional tool-less hardware available for ease of entry into electrical chamber. Housing is IP66 rated.

Optics
Choice of 16 patented, high-efficiency AccuLED Optics. The optics are precisely designed to shape the distribution maximizing efficiency and application spacing. AccuLED Optics create consistent distributions with the scalability to meet customized application requirements. Offered standard in 4000K (+/- 275K) CCT and minimum 70 CRI. Optional 6000K CCT and 3000K CCT. For the ultimate level of spill light control, an optional house side shield accessory can be field or factory installed. The house side shield is designed to seamlessly integrate with the SL2, SL3, SL4 or AFL optics.

Electrical
LED drivers are mounted to removable tray assembly for ease of maintenance. 120-277V 50/60Hz, 347V 60Hz or 480V 60Hz operation. Standard with 0-10V dimming. Shipped standard with Cooper Lighting proprietary circuit module designed to withstand 10kV of transient line surge. The Galleon LED luminaire is suitable for operation in -40°C to 40°C ambient environments. For applications with ambient temperatures exceeding 40°C, specify the HA (High Ambient) option. Light Squares are IP66 rated. Greater than 90% lumen maintenance expected at 60,000 hours. Available in standard 1A drive current and optional 530mA and 700mA drive currents.

Mounting
Extruded aluminum arm includes internal bolt guides allowing for easy positioning of fixture during assembly. Designed for pole or wall mounting. When mounting two or more luminaires at 90° or 120° apart, the EA extended arm may be required. Refer to the arm mounting requirement table on page 3. Round pole top adapter included. For wall mounting, specify wall mount bracket option. 3G vibration rated.

Finish
Housing finished in super durable TGIC polyester powder coat paint, 2.5 mil nominal thickness for superior protection against fade and wear. Heat sink is powder coated black. Standard colors include black, bronze, grey, white, dark platinum and graphite metallic. RAL and custom color matches available. Consult the McGraw-Edison Architectural Colors brochure for the complete selection.

Warranty
Five-year warranty.

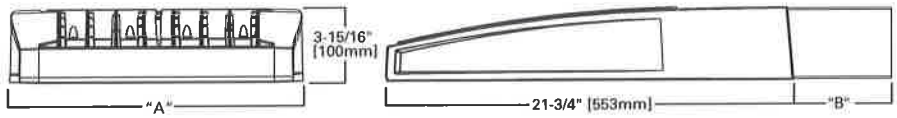
GLEON
GALLEON LED

1-10 Light Squares
Solid State LED

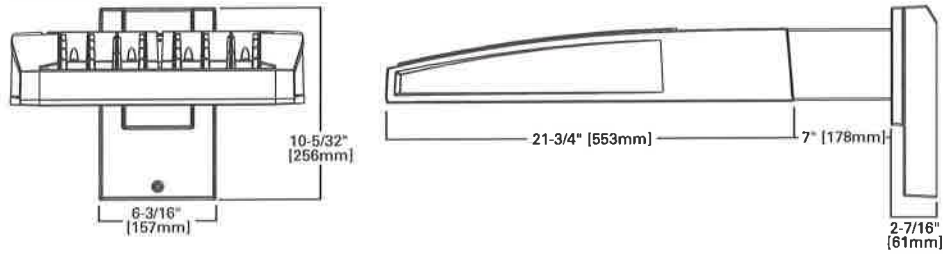
AREA/SITE LUMINAIRE

DIMENSIONS

POLE MOUNT



WALL MOUNT



DIMENSION DATA

Number of Light Squares	"A" Width	"B" Standard Arm Length	"B" Optional Arm Length [1]	Weight with Arm (lbs.)	EPA with Arm [2] (Sq. Ft.)
1-4	15-1/2" (394mm)	7" (178mm)	10" (254mm)	33 (15.0 kgs.)	0.96
5-6	21-5/8" (549mm)	7" (178mm)	10" (254mm)	44 (20.0 kgs.)	1.00
7-8	27-5/8" (702mm)	7" (178mm)	13" (330mm)	54 (24.5 kgs.)	1.07
9-10	33-3/4" (857mm)	7" (178mm)	16" (406mm)	63 (28.6 kgs.)	1.12

NOTES: 1 Extended arm option may be required when mounting two or more fixtures per pole at 90° or 120°. Refer to arm mounting requirement table. **2** EPA calculated with optional arm length.

DLC

CERTIFICATION DATA
UL/cUL Wet Location Listed
ISO 9001
LM79 / LM80 Compliant
3G Vibration Rated
IP66 Rated
DesignLights Consortium® Qualified*

ENERGY DATA
Electronic LED Driver
>0.9 Power Factor
<20% Total Harmonic Distortion
120V-277V 50/60Hz
347V & 480V 60Hz
-40°C Min. Temperature
40°C Max. Temperature
50°C Max. Temperature (HA Option)

Cooper Lighting
by EATON

*www.designlights.org

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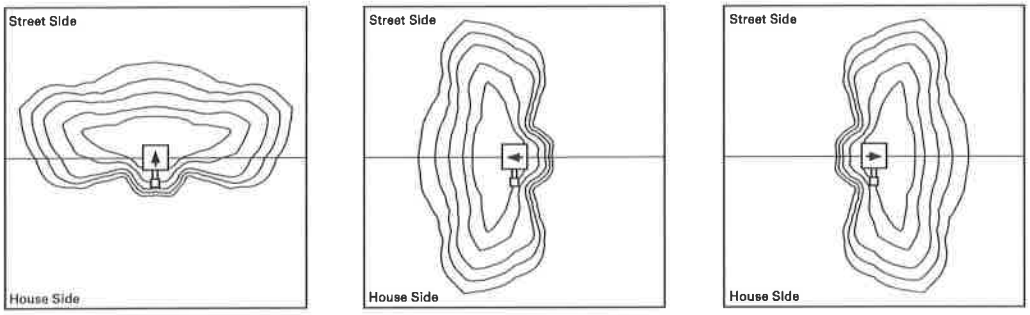
2015-01-29 14:53:26

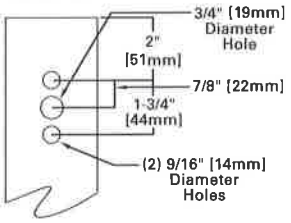
OPTIC ORIENTATION



Standard | **Optics Rotated Left @ 90°** [L90] | **Optics Rotated Right @ 90°** [R90]

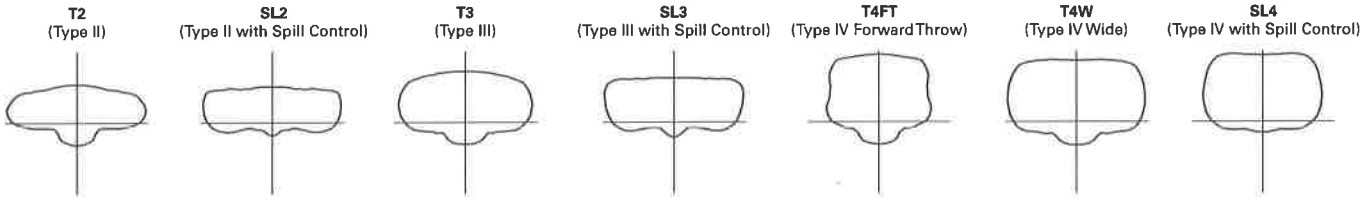
DRILLING PATTERN

TYPE "N"

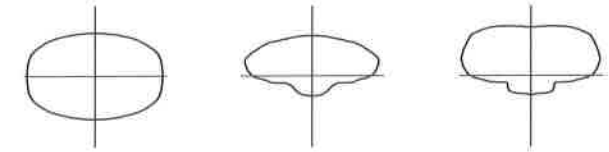


OPTICAL DISTRIBUTIONS

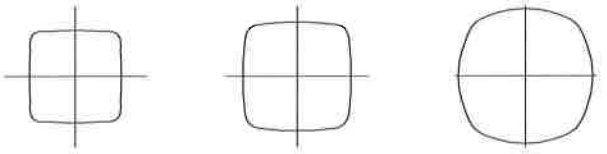
Asymmetric Area Distributions



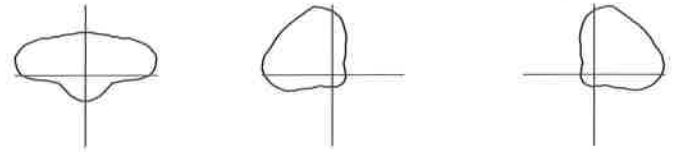
Asymmetric Roadway Distributions



Symmertric Distributions

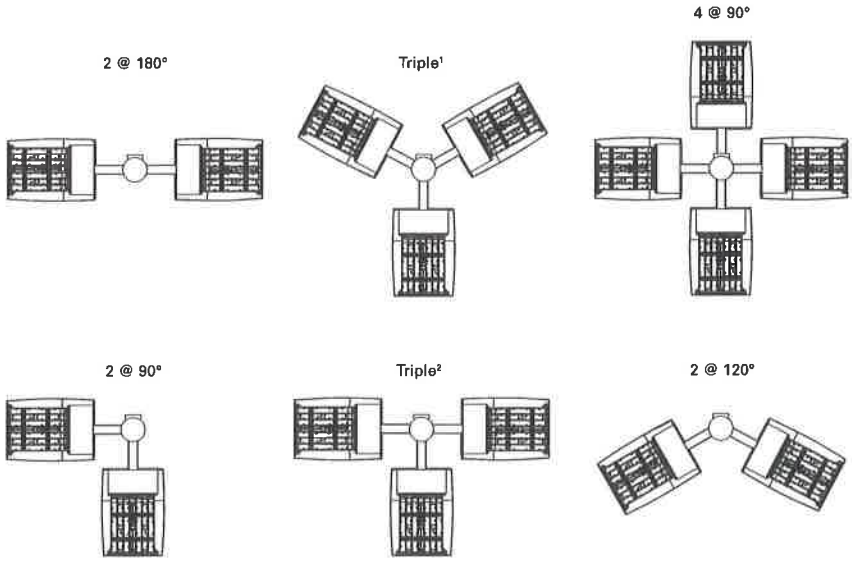


Specialized Distributions



ARM MOUNTING REQUIREMENTS

Configuration	90° Apart	120° Apart
GLEON-AE-01	7" Arm (Standard)	7" Arm (Standard)
GLEON-AE-02	7" Arm (Standard)	7" Arm (Standard)
GLEON-AE-03	7" Arm (Standard)	7" Arm (Standard)
GLEON-AE-04	7" Arm (Standard)	7" Arm (Standard)
GLEON-AE-05	10" Extended Arm (Required)	7" Arm (Standard)
GLEON-AE-06	10" Extended Arm (Required)	7" Arm (Standard)
GLEON-AE-07	13" Extended Arm (Required)	13" Extended Arm (Required)
GLEON-AE-08	13" Extended Arm (Required)	13" Extended Arm (Required)
GLEON-AE-09	16" Extended Arm (Required)	16" Extended Arm (Required)
GLEON-AE-10	16" Extended Arm (Required)	16" Extended Arm (Required)



Cooper Lighting by EATON

Eaton
1000 Eaton Boulevard
Cleveland, OH 44122
United States
Eaton.com

Eaton's Cooper Lighting Business
1121 Highway 74 South
Peachtree City, GA 30269
P: 770-486-4800
www.cooperlighting.com

Specifications and dimensions subject to change without notice

NOMINAL POWER AND LUMENS (1A)

Number of Light Squares		1	2	3	4	5	6	7	8	9	10
Drive Current		1A	1A	1A	1A	1A	1A	1A	1A	1A	1A
Nominal Power (Watts)		56	107	157	213	264	315	370	421	475	528
Input Current @ 120V (A)		0.47	0.90	1.31	1.79	2.21	2.64	3.09	3.51	3.96	4.41
Input Current @ 208V (A)		0.28	0.51	0.74	1.02	1.25	1.48	1.76	1.99	2.22	2.50
Input Current @ 240V (A)		0.25	0.45	0.65	0.90	1.10	1.30	1.55	1.75	1.95	2.20
Input Current @ 277V (A)		0.23	0.41	0.59	0.82	1.00	1.18	1.41	1.59	1.77	2.00
Optics											
T2	Lumens	5,272	10,303	15,373	20,313	25,168	30,118	35,618	40,357	45,018	49,842
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B4-U0-G5	B4-U0-G5
T2R	Lumens	5,597	10,938	16,321	21,565	26,719	31,974	37,813	42,844	47,792	52,914
	BUG Rating	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B4-U0-G4	B4-U0-G5
T3	Lumens	5,374	10,501	15,669	20,704	25,652	30,697	36,303	41,134	45,884	50,802
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
T3R	Lumens	5,493	10,735	16,017	21,164	26,222	31,379	37,110	42,048	46,904	51,930
	BUG Rating	B1-U0-G2	B1-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
T4FT	Lumens	5,405	10,562	15,760	20,824	25,801	30,875	36,514	41,372	46,150	51,096
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
T4W	Lumens	5,335	10,426	15,556	20,555	25,468	30,476	36,042	40,838	45,554	50,436
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5	B4-U0-G5
SL2	Lumens	5,263	10,285	15,347	20,278	25,124	30,066	35,556	40,288	44,940	49,756
	BUG Rating	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B4-U0-G5	B4-U0-G5
SL3	Lumens	5,373	10,500	15,667	20,701	25,649	30,693	36,298	41,128	45,878	50,794
	BUG Rating	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
SL4	Lumens	5,105	9,976	14,886	19,669	24,370	29,163	34,488	39,078	43,591	48,262
	BUG Rating	B1-U0-G2	B1-U0-G3	B1-U0-G3	B2-U0-G4	B2-U0-G4	B2-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
5NQ	Lumens	5,542	10,830	16,160	21,352	26,455	31,658	37,439	42,421	47,320	52,392
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G4
5MQ	Lumens	5,644	11,029	16,457	21,745	26,942	32,241	38,128	43,202	48,191	53,356
	BUG Rating	B3-U0-G1	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G5
5WQ	Lumens	5,659	11,059	16,501	21,803	27,014	32,327	38,230	43,317	48,320	53,498
	BUG Rating	B3-U0-G1	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G5	B5-U0-G5	B5-U0-G5
SLL/SLR	Lumens	4,722	9,227	13,767	18,191	22,539	26,971	31,897	36,141	40,315	44,635
	BUG Rating	B1-U0-G2	B1-U0-G3	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5	B3-U0-G5
RW	Lumens	5,492	10,732	16,014	21,159	26,216	31,372	37,101	42,038	46,893	51,918
	BUG Rating	B2-U0-G1	B3-U0-G1	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4
AFL	Lumens	5,512	10,771	16,072	21,236	26,311	31,486	37,236	42,191	47,063	52,107
	BUG Rating	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G4

* Nominal data for 4000K CCT.

NOMINAL POWER AND LUMENS (700MA)

Number of Light Squares		1	2	3	4	5	6	7	8	9	10
Drive Current		700mA	700mA	700mA	700mA	700mA	700mA	700mA	700mA	700mA	700mA
Nominal Power (Watts)		38	72	105	138	176	210	243	276	314	348
Input Current @ 120V (A)		0.32	0.59	0.86	1.14	1.45	1.72	2	2.28	2.58	2.86
Input Current @ 208V (A)		0.21	0.36	0.51	0.67	0.87	1.02	1.18	1.34	1.53	1.69
Input Current @ 240V (A)		0.19	0.32	0.45	0.59	0.77	0.90	1.04	1.18	1.35	1.49
Input Current @ 277V (A)		0.20	0.29	0.40	0.51	0.69	0.80	0.91	1.02	1.20	1.31
Optics											
T2	Lumens	3,854	7,531	11,237	14,847	18,395	22,013	26,033	29,497	32,904	36,430
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4
T2R	Lumens	4,091	7,995	11,929	15,762	19,529	23,370	27,638	31,316	34,932	38,676
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4
T3	Lumens	3,928	7,676	11,453	15,133	18,750	22,437	26,534	30,065	33,537	37,132
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5
T3R	Lumens	4,015	7,846	11,707	15,469	19,166	22,936	27,124	30,733	34,283	37,957
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
T4FT	Lumens	3,951	7,720	11,519	15,221	18,858	22,567	26,688	30,240	33,732	37,347
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5
T4W	Lumens	3,900	7,620	11,370	15,024	18,615	22,276	26,343	29,849	33,296	36,864
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5	B3-U0-G5
SL2	Lumens	3,847	7,518	11,217	14,821	18,364	21,975	25,988	29,447	32,847	36,368
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5
SL3	Lumens	3,927	7,675	11,451	15,131	18,747	22,434	26,531	30,061	33,533	37,126
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G3	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
SL4	Lumens	3,731	7,292	10,880	14,376	17,812	21,315	25,208	28,562	31,861	35,275
	BUG Rating	B1-U0-G2	B1-U0-G2	B1-U0-G3	B1-U0-G3	B2-U0-G4	B2-U0-G4	B2-U0-G4	B2-U0-G5	B2-U0-G5	B3-U0-G5
5NQ	Lumens	4,051	7,916	11,811	15,606	19,336	23,139	27,365	31,006	34,587	38,294
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G2	B5-U0-G3	B5-U0-G3
5MQ	Lumens	4,125	8,062	12,029	15,894	19,692	23,565	27,869	31,577	35,224	38,999
	BUG Rating	B2-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4
5WQ	Lumens	4,136	8,083	12,061	15,936	19,745	23,628	27,943	31,661	35,318	39,103
	BUG Rating	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4	B5-U0-G4	B5-U0-G4
SLL/SLR	Lumens	3,451	6,744	10,063	13,296	16,474	19,714	23,314	26,416	29,467	32,625
	BUG Rating	B1-U0-G1	B1-U0-G2	B1-U0-G3	B2-U0-G3	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5	B3-U0-G5
RW	Lumens	4,014	7,844	11,704	15,465	19,162	22,930	27,118	30,726	34,274	37,948
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3
AFL	Lumens	4,029	7,873	11,747	15,522	19,231	23,014	27,216	30,838	34,399	38,086
	BUG Rating	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G3

* Nominal data for 4000K CCT.

NOMINAL POWER AND LUMENS (530MA)

Number of Light Squares		1	2	3	4	5	6	7	8	9	10
Drive Current		530mA	530mA	530mA	530mA	530mA	530mA	530mA	530mA	530mA	530mA
Nominal Power (Watts)		30	54	80	105	130	159	184	209	234	259
Input Current @ 120V (A)		0.25	0.45	0.66	0.86	1.07	1.32	1.52	1.72	1.93	2.14
Input Current @ 208V (A)		0.17	0.28	0.39	0.51	0.63	0.78	0.9	1.02	1.14	1.26
Input Current @ 240V (A)		0.17	0.25	0.35	0.45	0.55	0.70	0.80	0.90	1.00	1.10
Input Current @ 277V (A)		0.19	0.24	0.32	0.40	0.49	0.64	0.72	0.80	0.89	0.98
Optics											
T2	Lumens	3,079	6,017	8,978	11,862	14,697	17,588	20,800	23,567	26,289	29,106
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4
T2R	Lumens	3,269	6,388	9,531	12,593	15,603	18,672	22,082	25,020	27,909	30,900
	BUG Rating	B1-U0-G1	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G4
T3	Lumens	3,138	6,133	9,150	12,091	14,980	17,926	21,200	24,021	26,795	29,667
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4
T3R	Lumens	3,208	6,269	9,354	12,359	15,313	18,325	21,671	24,555	27,390	30,326
	BUG Rating	B1-U0-G1	B1-U0-G2	B1-U0-G2	B2-U0-G2	B2-U0-G3	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4
T4FT	Lumens	3,156	6,168	9,203	12,161	15,067	18,030	21,323	24,160	26,950	29,839
	BUG Rating	B1-U0-G1	B1-U0-G2	B1-U0-G2	B2-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5
T4W	Lumens	3,116	6,088	9,084	12,004	14,872	17,797	21,047	23,848	26,602	29,453
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G5
SL2	Lumens	3,074	6,006	8,962	11,842	14,672	17,558	20,764	23,527	26,244	29,056
	BUG Rating	B1-U0-G1	B1-U0-G2	B2-U0-G2	B2-U0-G3	B2-U0-G3	B3-U0-G3	B3-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4
SL3	Lumens	3,138	6,132	9,149	12,089	14,978	17,924	21,197	24,018	26,791	29,662
	BUG Rating	B1-U0-G1	B1-U0-G2	B1-U0-G2	B2-U0-G3	B2-U0-G3	B2-U0-G3	B3-U0-G4	B3-U0-G4	B3-U0-G4	B3-U0-G4
SL4	Lumens	2,981	5,826	8,693	11,486	14,231	17,030	20,140	22,820	25,456	28,184
	BUG Rating	B0-U0-G1	B1-U0-G2	B1-U0-G3	B1-U0-G3	B1-U0-G3	B2-U0-G3	B2-U0-G4	B2-U0-G4	B2-U0-G4	B2-U0-G5
5NQ	Lumens	3,236	6,324	9,437	12,469	15,449	18,487	21,863	24,773	27,634	30,595
	BUG Rating	B1-U0-G0	B2-U0-G1	B3-U0-G1	B3-U0-G2	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G2
5MQ	Lumens	3,296	6,441	9,610	12,698	15,733	18,828	22,266	25,229	28,142	31,158
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G3
5WQ	Lumens	3,305	6,458	9,636	12,732	15,775	18,878	22,325	25,296	28,217	31,241
	BUG Rating	B2-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3	B5-U0-G3	B5-U0-G3	B5-U0-G4	B5-U0-G4
SLL/SLR	Lumens	2,757	5,388	8,040	10,623	13,162	15,751	18,627	21,105	23,543	26,066
	BUG Rating	B1-U0-G1	B1-U0-G2	B1-U0-G2	B1-U0-G3	B2-U0-G3	B2-U0-G3	B2-U0-G3	B2-U0-G4	B3-U0-G4	B3-U0-G4
RW	Lumens	3,207	6,267	9,351	12,356	15,309	18,320	21,666	24,549	27,384	30,319
	BUG Rating	B2-U0-G1	B3-U0-G1	B3-U0-G1	B3-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B4-U0-G2	B5-U0-G3
AFL	Lumens	3,219	6,290	9,385	12,401	15,365	18,387	21,745	24,638	27,484	30,429
	BUG Rating	B1-U0-G1	B1-U0-G1	B1-U0-G1	B2-U0-G2	B2-U0-G2	B2-U0-G2	B2-U0-G2	B3-U0-G2	B3-U0-G3	B3-U0-G3

* Nominal data for 4000K CCT.

LUMEN MULTIPLIER

Ambient Temperature	Lumen Multiplier
0°C	1.02
10°C	1.01
25°C	1.00
40°C	0.99
50°C	0.97

LUMEN MAINTENANCE

Ambient Temperature	TM-21 Lumen Maintenance (60,000 Hours)	Theoretical L70 (Hours)
25°C	> 94%	> 350,000
40°C	> 93%	> 250,000
50°C	> 90%	> 170,000

ORDERING INFORMATION

Sample Number: GLEON-AE-04-LED-E1-T3-GM-700

Product Family [1]	Light Engine	Number of Light Squares [2]	Lamp Type	Voltage	Distribution	Color	Mounting
GLEON=Galleon	**AE**=1A Drive Current	**01**=1 **02**=2 **03**=3 **04**=4 **05**=5 **06**=6 **07**=7 **08**=8 **09**=9 **10**=10	**LED**=Solid State Light Emitting Diodes	**E1**=120-277V **347**=347V [3] **480**=480V [3,4]	**T2**=Type II **T2R**=Type II Roadway **T3**=Type III **T3R**=Type III Roadway **T4FT**=Type IV Forward Throw **T4W**=Type IV Wide **5NQ**=Type V Narrow **5MQ**=Type V Square Medium **5WQ**=Type V Square Wide **SL2**=Type II w/Spill Control **SL3**=Type III w/Spill Control **SL4**=Type IV w/Spill Control **SLL**=90° Spill Light Eliminator Left **SLR**=90° Spill Light Eliminator Right **RW**=Rectangular Wide Type I **AFL**=Automotive Frontline	**AP**=Grey **BZ**=Bronze **BK**=Black **DP**=Dark Platinum **GM**=Graphite Metallic **WH**=White	**[Blank]**=Arm for Round or Square Pole **EA**=Extended Arm [5] **MA**=Mast Arm Adapter [6] **WM**=Wall Mount

Options (Add as Suffix)

2L=Two Circuits [7,8]
7030=70 CRI 3000K [9]
8030=80 CRI 3000K [10]
7050=70 CRI 5000K [10]
7060=70 CRI 6000K [9]
530=Drive Current Factory Set to 530mA [10]
700=Drive Current Factory Set to 700mA [10]
F=Single Fuse (120, 277 or 347V. Must Specify Voltage)
FF=Double Fuse (208, 240 or 480V. Must Specify Voltage)
P=Button Type Photocontrol (120, 208, 240 or 277V)
PER7=NEMA 7-PIN Twistlock Photocontrol Receptacle
R=NEMA Twistlock Photocontrol Receptacle
HA=50°C High Ambient [8]
MS/DIM-L08=Motion Sensor for Dimming Operation, Maximum 8' Mounting Height [12,13,14,15,18]
MS/DIM-L20=Motion Sensor for Dimming Operation, 9' - 20' Mounting Height [12,13,14,15,17]
MS/DIM-L40=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height [12,13,14,15,18]
MS/DIM-L40W=Motion Sensor for Dimming Operation, 21' - 40' Mounting Height (Wide Range) [12,13,14,15,19]
MS/X-L08=Bi-Level Motion Sensor, Maximum 8' Mounting Height [12,13,14,16,20]
MS/X-L20=Bi-Level Motion Sensor, 9' - 20' Mounting Height [12,13,14,15,17,20]
MS/X-L40=Bi-Level Motion Sensor, 21' - 40' Mounting Height [12,13,14,15,18,20]
MS/X-L40W=Bi-Level Motion Sensor, 21' - 40' Mounting Height (Wide Range) [12,13,14,15,19,20]
MS-L08=Motion Sensor for ON/OFF Operation, Maximum 8' Mounting Height [12,13,14,15,16]
MS-L20=Motion Sensor for ON/OFF Operation, 9' - 20' Mounting Height [12,13,14,15,17]
MS-L40=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height [12,13,14,15,18]
MS-L40W=Motion Sensor for ON/OFF Operation, 21' - 40' Mounting Height (Wide Range) [12,13,14,15,19]
DIMRF-LW=LumaWatt Wireless Sensor, Wide Lens for 8' - 16' Mounting Height [21]
DIMRF-LN=LumaWatt Wireless Sensor, Narrow Lens for 16' - 40' Mounting Height [21]
L90=Optics Rotated 90° Left
R90=Optics Rotated 90° Right
MT=Factory Installed Mesh Top
TH=Tool-less Door Hardware
LCF=Light Square Trim Plate Painted to Match Housing [22]
HSS=Factory Installed House Side Shield [23]

Accessories (Order Separately)

OA/RA1016=NEMA Photocontrol Multi-Tap - 105-285V
OA/RA1027=NEMA Photocontrol - 480V
OA/RA1201=NEMA Photocontrol - 347V
OA/RA1013=Photocontrol Shorting Cap
OA/RA1014=120V Photocontrol
MA1252=10kV Surge Module Replacement
MA1036-XX=Single Tenon Adapter for 2-3/8" O.D. Tenon
MA1037-XX=2@180° Tenon Adapter for 2-3/8" O.D. Tenon
MA1197-XX=3@120° Tenon Adapter for 2-3/8" O.D. Tenon
MA1188-XX=4@90° Tenon Adapter for 2-3/8" O.D. Tenon
MA1189-XX=2@90° Tenon Adapter for 2-3/8" O.D. Tenon
MA1190-XX=3@90° Tenon Adapter for 2-3/8" O.D. Tenon
MA1191-XX=2@120° Tenon Adapter for 2-3/8" O.D. Tenon
MA1038-XX=Single Tenon Adapter for 3-1/2" O.D. Tenon
MA1039-XX=2@180° Tenon Adapter for 3-1/2" O.D. Tenon
MA1192-XX=3@120° Tenon Adapter for 3-1/2" O.D. Tenon
MA1193-XX=4@90° Tenon Adapter for 3-1/2" O.D. Tenon
MA1194-XX=2@90° Tenon Adapter for 3-1/2" O.D. Tenon
MA1195-XX=3@90° Tenon Adapter for 3-1/2" O.D. Tenon
FSIR-100=Wireless Configuration Tool for Occupancy Sensor [24]
GLEON-MT1=Field Installed Mesh Top for 1-4 Light Squares
GLEON-MT2=Field Installed Mesh Top for 5-6 Light Squares
GLEON-MT3=Field Installed Mesh Top for 7-8 Light Squares
GLEON-MT4=Field Installed Mesh Top for 9-10 Light Squares
LS/HSS=Field Installed House Side Shield [23,25]

Notes:
1. DesignLights Consortium® Qualified. Refer to www.designlights.org Qualified Products List under Family Models for details.
2. Standard 4000K CCT and minimum 70 CRI.
3. Requires the use of a step down transformer when combined with MS/DIM, MS/X or DIMRF.
4. Not to be used with un-grounded systems.
5. May be required when two or more luminaires are oriented on a 90° or 120° drilling pattern. Refer to arm mounting requirement table.
6. Factory installed.
7. 2L is not available with MS, MS/X or MS/DIM at 347V or 480V. 2L in AE-02 through AE-04 requires a larger housing, normally used for AE-05 or AE-06. Extended arm option may be required when mounting two or more fixtures per pole at 90° or 120°. Refer to arm mounting requirement table.
8. Not available with LumaWatt wireless sensors.
9. Extended lead times apply. Use dedicated IES files for 3000K and 6000K when performing layouts. These files are published on the Galleon luminaire product page on the website.
10. Extended lead times apply. For 8030, factor 7030 IES files x .92 (8% lumen loss). For 7050, use 7060 IES files.
11. 1 Amp standard. Use dedicated IES files for 530mA and 700mA when performing layouts. These files are published on the Galleon luminaire product page on the website.
12. Consult factory for more information.
13. Utilizes internal step down transformer when 347V or 480V is selected.
14. The FSIR-100 accessory is required to adjust parameters.
15. Not available with HA option.
16. Approximately 22' detection diameter at 8' mounting height.
17. Approximately 40' detection diameter at 20' mounting height.
18. Approximately 60' detection diameter at 40' mounting height.
19. Approximately 100' detection diameter at 40' mounting height.
20. Replace X with number of Light Squares operating in low output mode.
21. LumaWatt wireless sensors are factory installed only requiring network components RF-EM1, RF-GW1 and RF-ROUT1 in appropriate quantities. See www.cooperlighting.com for LumaWatt application information.
22. Not available with house side shield (HSS).
23. Only for use with SL2, SL3, SL4 and AFL distributions. The Light Square trim plate is painted black when the HSS option is selected.
24. This tool enables adjustment of parameters including high and low modes, sensitivity, time delay, cutoff and more. Consult your Eaton's Cooper Lighting business representative for additional details.
25. One required for each Light Square.

Cooper Lighting
by EATON

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Specifications and dimensions subject to change without notice